Title:
2018 New York Sweet Corn Pheromone Trap Network (SCPTN)

Project leader(s):
Marion Zuefle New York State Integrated Pest Management Program

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Abstract:
For 24 years, the Sweet Corn Pheromone Trap Network has been monitoring the flight of three important insect pests of sweet corn, European corn borer, corn earworm, fall armyworm, and more recently, 2010, Western bean cutworm. These insects cause damage to sweet corn ears in their larval stage. These pests are moths in their adult stage and can be monitored using traps baited with pheromone lures specific for each species. Traps are placed near sweet corn fields to monitor moth flights. The weekly trap catch information allows growers, consultants, Cooperative Extension and vegetable processor field staff to track the flights and make informed decisions about when sweet corn fields need to be scouted or treated with an insecticide. This project was funded in part by in-kind contributions from growers and consultants who host and check traps.

Background and justification:
Sweet corn for the fresh and processing markets is an important crop throughout NY. In 2017 sweet corn was planted on 26,700 acres in New York with a value of 33 million dollars (USDA 2017 Vegetable Summary). Four major pests of sweet corn, European corn borer (ECB-E and ECB-Z), corn earworm (CEW), fall armyworm (FAW) and Western bean cutworm (WBC) can be monitored in their adult stage using pheromone traps. Pest management is an especially important aspect of fresh market sweet corn production because the unhusked ear is marketed, and buyers are frequently very sensitive to insect damage or the presence of larvae in the ear. Harvest quality requirements are different for processing corn, which usually receives fewer insecticide applications than fresh market corn. Integrated pest management practices are widely used on both crops to determine the need for insecticide applications. Pheromone trap catches provide valuable information to growers, consultants, and processor field staff making pest management decisions. Pheromone trap catches help growers and consultants decide when to start scouting fields for egg masses and larvae, reinforce what scouts are finding, help growers choose the best

spray materials for the pest complex that's present, and alert the industry to the arrival of the migratory pests, CEW and FAW.

Pheromone Trap catches from 19 sites in western NY and 18 sites in Eastern NY (Figure 1) were an integral part of the weekly pest update newsletter, *VegEdge* and *Veg Update*. VegEdge is sent by the Cornell Vegetable Program to subscribers in 14 counties and *Veg Update* is sent by the Eastern NY Commercial Horticulture Program (ENYCHP) to subscribers in 17 counties. The Trap catches were also posted weekly to the sweet corn pheromone trap network blog, linked through the NYS IPM Program website, the Network for Environment and Weather Applications website, and posted to a regional website (PestWatch) that includes trap catches from several northeastern states, making the information available to a large number of growers and extension personnel.

Objectives:

1. Establish and maintain a network of pheromone traps for sweet corn pests in NY.
2. Provide regional trapping information and recommendations to extension field staff and consultants working with sweet corn growers.
3. Provide regional trapping information to growers, along with scouting and threshold recommendations.

Procedures:

1. Sets of one each of ECB-E, ECB-Z, CEW, FAW, and WBC traps were placed at each of 37 trapping locations, 19 sites in western NY and 18 sites in eastern NY (Figure 1). Scentry Heliothis net traps were used to trap ECB and CEW. The BCS/Agrisense Unitrap was used for FAW and WBC. Lures from Trece Inc. were used for both races of ECB. Lures from Scentry Inc. were used for CEW, FAW and WBC. All lures were replaced every two weeks.
   ECB, CEW, and FAW traps were set up in late-May at fresh market locations, and as processing fields approached tassel emergence in other locations. WBC traps were set up in early to mid-June.
   Traps were placed at least 40 meters apart in grassy areas near sweet corn fields, avoiding areas near hedgerows where air circulation is poor. Heliothis traps were mounted on posts such that the bottom of the trap is ~6" above the grassy canopy. Unitraps were hung from short stakes to which angle brackets had been attached and were placed either in the field or at the edge of the field. Whenever possible, traps were moved to new fields as the previous fields matured (silks became dry) and became less attractive to moths.
2. Cooperators checked traps weekly on Monday or Tuesday and sent trap catch numbers to Marion Zuefle via phone or email. Weekly catches for each location were collated and posted, along with interpretation and scouting and thresholds recommendations for fresh market sweet corn, on the sweetcorn.nysipm.cornell.edu blog.
3. Information posted on the blog was used directly by subscribing growers, incorporated into crop and pest updates distributed weekly by regional extension programs, or provided to growers via direct contact with collaborating consultants. All catches were also posted on the PestWatch website

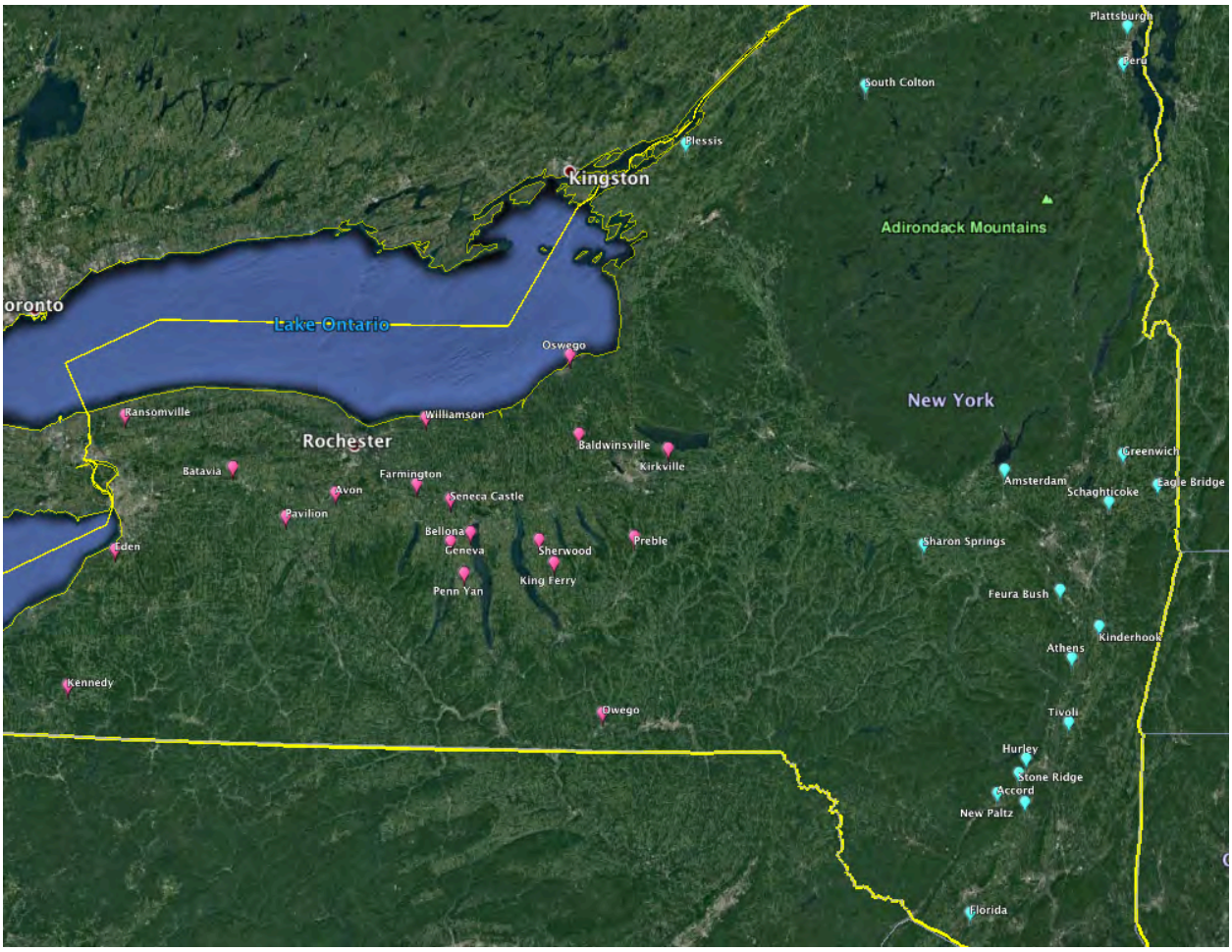

Figure 1. Map showing the 19 trap locations in western NY (pink) and the 18 trap locations in eastern NY (blue).

Results and discussion:

The overall trend for the flights of the five moth species is represented in Figure 2, which gives the average trap catch for all 37 sites. ECB-E and ECB-Z remained fairly low throughout the season, this is similar to what we experienced in 2017 (Figure 3). Both of these moths continue to decline overall when looking at the 25-year trend (Figure 4). This decline has been attributed in part to the increase use of Bt field corn.

WBC peaked July 31st with an average trap catch of 33 moths, slightly lower and earlier than 2017 (Figure 3). FAW peaked in late August, again earlier than 2017 by a week, with an average trap catch of 38 moths, higher than in 2017 which was 25.

The biggest difference this year was in the CEW flight. The highest catch of CEW (341) occurred on 9/4/18 in King Ferry. This was the highest catch for a single site in one week since we began monitoring in 1994 (24 years ago). In 2017 we experienced the lowest year for CEW (average trap catch per location per week) since we began monitoring in 1997 (Figure 5). This year, 2018, we had the third highest CEW flight since 1997 (Figure 5).

There are several possible reasons for the high flight this year. CEW migrates from the south every year, though we do have some small pockets of overwintering moths in NY. The overwintering moths are caught in June with peak flight from the migratory moths occurring in early September. With climate change we are experiencing warmer falls and more frequent storm fronts that could bring more CEW up from the south.

CEW in the south feeds on Bt cotton (as the cotton bollworm) as well as on Bt field corn and Bt sweet corn in the North and South. The high acreage of Bt field corn and Bt cotton has contributed to resistance to Bt sweet corn, especially those expressing the Cry toxins. In addition to Bt resistance, CEW has also shown resistance to pyrethroid insecticides. All of these reasons could have contributed to the extremely high flight of CEW observed this summer.

Pest pressure varies greatly among years but also within a year depending on the site location. This can be seen in the cumulative trap catch for each moth species at the 37 different sites (Table 1). For this reason, it is important to continue monitoring the flights throughout NY with traps placed in representative areas of the state.

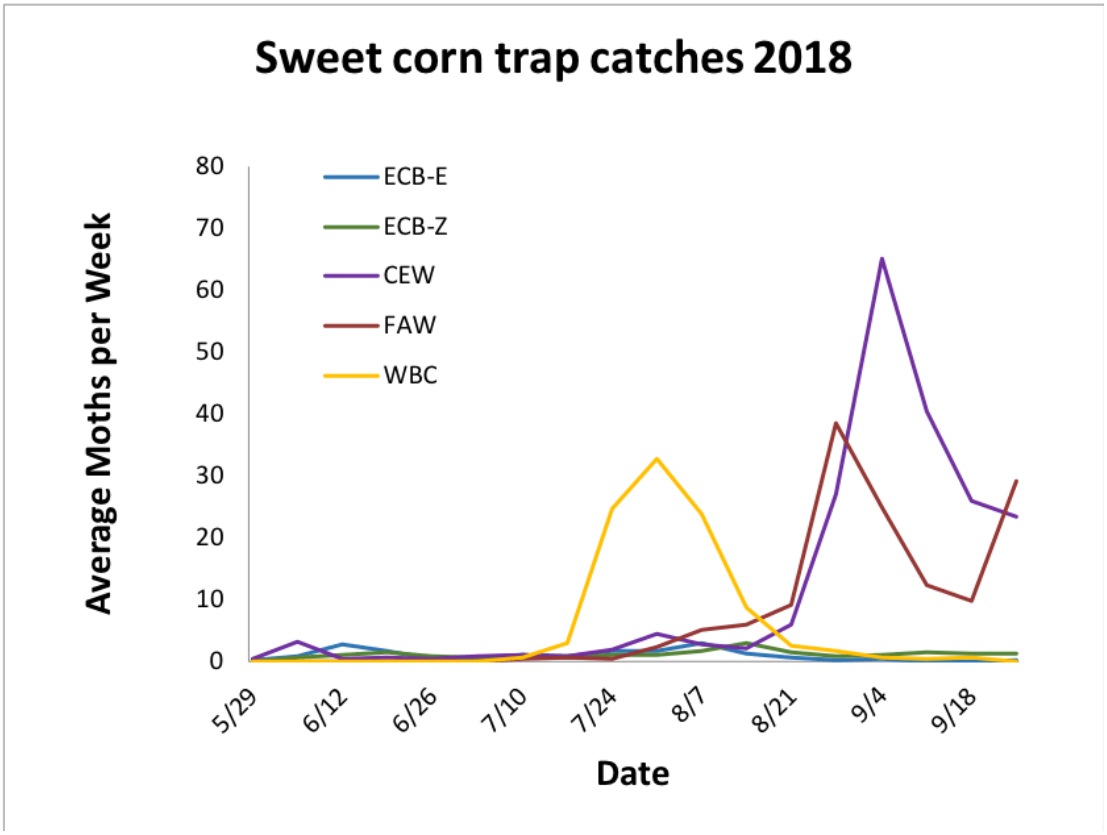

Figure 2. Average number of moths caught per week for all 37 sites in 2018

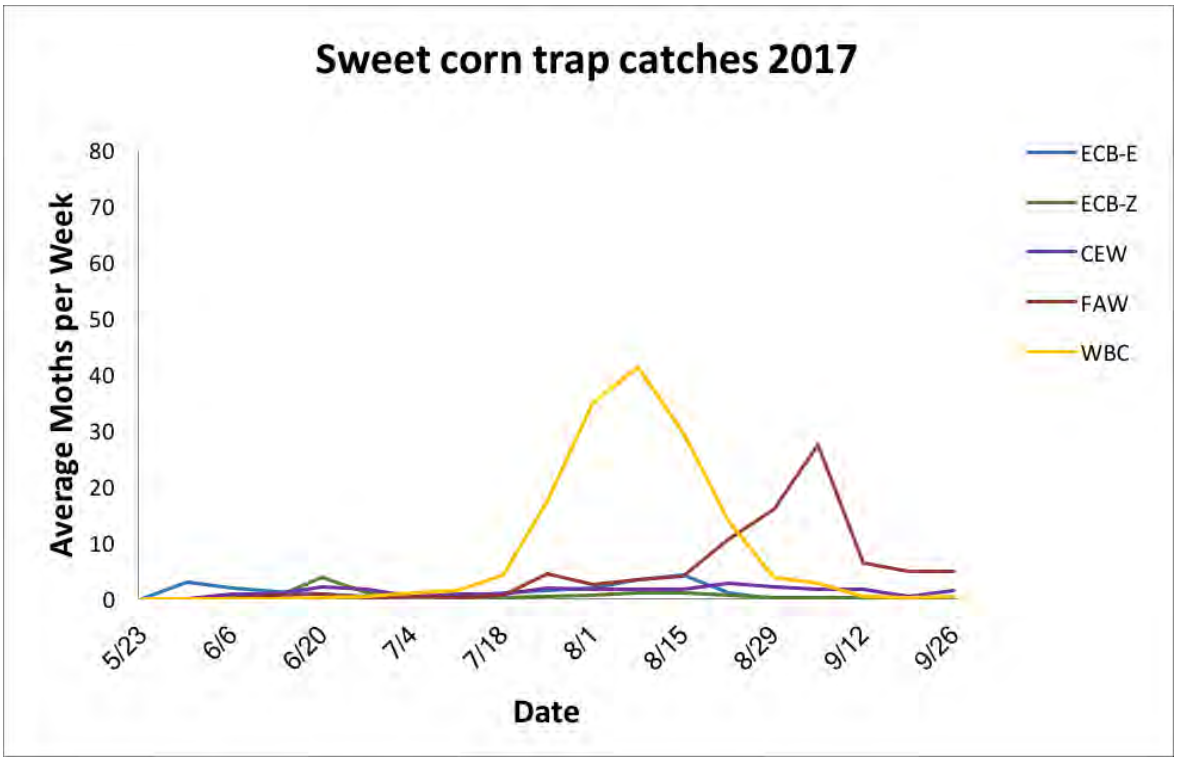

Figure 3. Average number of moths caught per week for all 36 sites in 2017

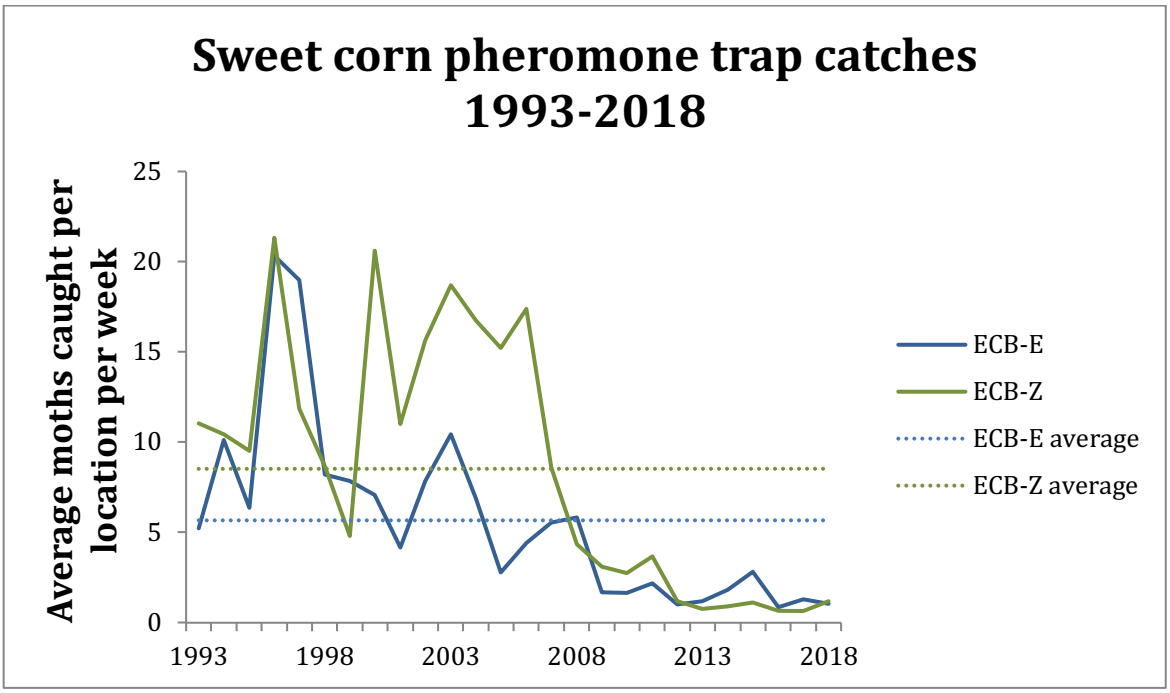

Figure 4. Average number of European corn borer, both E and Z race, moths caught per trapping location per year from 1993-2018.

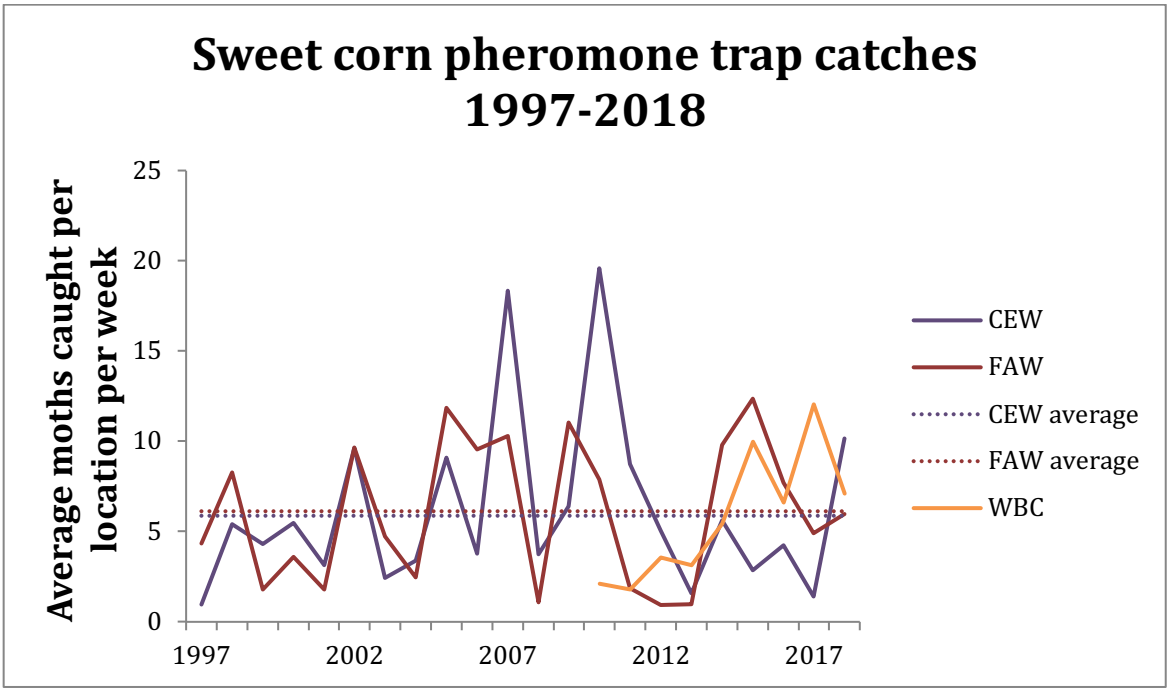

Figure 5. Average number of corn earworm (CEW), fall armyworm (FAW) and western bean cutworm (WBC) moths caught per trapping location per year from 1997-2018.

Table 1. Total moths caught at each of the 37 sites in 2018.

Site	ECB-E	ECB-Z	CEW	FAW	WBC
Accord	8	8	93	0	18
Amsterdam	13	11	21	2	104
Athens	15	10	22	1	22
Avon	2	1	27	10	102
Baldwinsville	2	4	94	313	142
Batavia	13	49	95	73	47
Bellona	7	25	195	24	147
Eagle Bridge	2	0	90	2	12
Eden	3	9	49	27	125
Farmington	6	1	204	62	11
Feura Bush	5	23	186	13	49
Florida	8	7	99	67	31
Geneva	51	50	67	91	11
Greenwich	7	10	39	4	36

Hurley	179	100	33	5	4
Kennedy	0	6	4	61	47
Kinderhook	13	19	173	24	53
King Ferry	2	0	829	537	40
Kirkville	16	1	8	2	5
New Paltz	17	24	182	0	11
Oswego	3	0	88	252	216
Owego	10	0	1	0	1
Pavilion	0	2	49	370	296
Penn Yan	0	94	351	209	67
Peru	7	1	40	7	273
Plattsburgh	8	0	193	21	585
Plessis	1	4	0	4	215
Preble	6	20	0	1	59
Ransomville	2	7	449	187	79
Schaghticoke	0	0	1	0	12
Seneca Castle	11	4	25	32	13
Sharon Springs	0	6	0	0	1
Sherwood	1	1	744	293	40
South Colton	26	9	4	0	212
Stone Ridge	32	13	47	0	0
Tivoli	7	11	15	0	0
Williamson	0	0	1	1	13

Project location(s):
Accord, Ulster Co.; Amsterdam, Fulton Co.; Athens, Greene Co.; Avon, Livingston Co.; Baldwinsville, Onondaga Co.; Batavia, Genesee Co.; Bellona, Yates Co.; Eagle Bridge, Washington Co.; Eden, Erie Co.; Farmington, Ontario Co.; Feura Bush, Albany Co.; Florida, Orange Co.; Geneva, Ontario Co.; Greenwich, Washington Co.; Hurley, Ulster Co.; Kennedy, Chautauqua Co.; Kinderhook, Columbia Co.; King Ferry, Cayuga Co.; Kirkville, Madison Co.; New Paltz, Ulster Co.; Oswego, Oswego Co.; Owego, Tioga Co.; Pavilion, Genesee Co.; Penn Yan, Yates Co.; Peru, Clinton Co.; Plattsburgh, Clinton Co.; Plessis, Jefferson Co.; Preble, Cortland Co.; Ransomville, Niagara Co.; Schaghticoke, Rensselear Co.; Seneca Castle, Ontario Co.; Sharon Springs, Schoharie Co.; Sherwood, Cayuga Co.; South Colton, St. Lawrence Co.; Stone Ridge, Ulster Co.; and Tivoli, Dutchess Co.; Williamson, Wayne Co.

Samples of resources developed:
Weekly blog posts from 5/29/18 to 9/25/18; totaling 18 posts were posted to the Sweet Corn Pheromone Trap Network Report blog found at: http://sweetcorn.nysipm.cornell.edu/. There are 108 subscribers to the blog and within the last year this blog has received 3,216 page views by 750 unique visitors.
The weekly blog posts are also included in the *VegEdge* newsletter which has 435 enrollees. Trap counts for eastern NY are presented in the *Weekly Veg update* which has 550 enrollees.

Zuefle, M. E. 2018. Sweet Corn Larval Pest Identification (Fact Sheet). NYS IPM. http://hdl.handle.net/1813/57328.

Zuefle, M. E. 2018. Identificación de Plagas de Larvas de Maíz Dulce (Spanish translation of Fact Sheet). NYS IPM. https://hdl.handle.net/1813/60519